Boreal Forest Model Validation with Discrete LiDAR and Spectral-Induced Fluorescence Remotely Sensed Data

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Main Objectives

1) Simulate the dynamics of forest patterns and processes under future climate and disturbance scenarios using an individual-based forest gap model

2) Assess tradeoffs in the delivery of ecosystem services under a set of stakeholder-informed management strategies at each study site using coupled forest-gap and ecological economics model output.
Objective 1 Updates: LiDAR

Voxel representation of LiDAR point clouds from G-LiHT overpass used to construct vegetation profiles.

Vertical profile metrics (left) and canopy surface metrics (right) constructed for 50-meter windows.

Ten coincident sites with UVAFME in Foster et al.
Objective 1 Updates: SIF

Oversampled TROPOMI SIF monthly mean data collected over TVSF

Established SIF/GPP relationships convert to GPP at sites

Re-run of Foster et al. sites using GPP-extension in Wang et al. 2017 for comparison
Objective 2 Updates: TVSF CAC

The Citizens Advisory Committee for the Tanana Valley State Forest are main collaborators for our first study site.

We planned to meet with representatives from the CAC in May in conjunction with this meeting in Fairbanks. Obviously, this will need to be rescheduled.

A new data stream from the DOF provides stand timber sales and cut year. This includes future scheduled harvest!

We have participated in the May annual meetings (remotely) in 2019 and 2020 and our workshop with them will take place in May of 2021.
Future Directions

1.) Complete TVSF-wide validation with TROPOMI SIF

2.) Complete validation of model runs with G-LiHT data

3.) Modify mortality sub-routine to accept harvest parameter inputs and generate timber product outputs.

4.) Simulation of 20-year forest management plan at TVSF in preparation for workshop in May 2021.

5.) Conceptual Framework manuscript on the integration of remote sensing, modeling, and calculating flows of ecosystem services.
Thank You!

Dynamic Modeling of Forest Ecosystem Processes and Services in North American Boreal Forests

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